

## BRIEF COMMUNICATIONS

POLYSACCHARIDES FROM *Brassica oleracea* var. *italica*

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Broccoli is used as an antioxidant, radioprotector, antitumor, and antiulcer agent, especially against *Helicobacter pylori*, the principal cause of gastroduodenal ulcers of the stomach and duodenum.

Broccoli plant fibers also have pharmacological effects such as appetite suppression and an increased feeling of satiation, normalization of intestinal motor function, growth inhibition of rotting microorganisms, and decreased uptake of fats in the small intestine and cholesterol level in blood [1-3].

Herein we present data on the isolation and general characteristics of broccoli polysaccharides. We studied air-dried broccoli varieties Tonus, Kalabraize, Vitaminic, Romaneska, and Linda, which were cultivated in Ukraine.

A weighed portion of broccoli (herb of the studied varieties) was defatted beforehand with  $\text{CHCl}_3$  [to remove lipophilic substances (LS)] and extracted successively with solvents such as ethanol (82%), to afford sugars soluble in alcohol (SSA); hot water, water-soluble polysaccharides (WSPS); oxalic acid and ammonium oxalate solutions (0.5%), pectinic substances (PS); and NaOH solution (10%), hemicellulose (HC) [1, 4]. Table 1 gives the results.

The variety Romaneska had the highest content of polysaccharides in the SSA, 18.85%; WSPS, 10.85; HC, 31.67%; variety Linda, SSA, 18.56%; HC, 23.22%; variety Tonus, PS, 9.99%; variety Kalabraize, SSA, 9.64%; variety Vitaminic, SSA, 12.63%; WSPS, 13.50%, HC, 34.18%.

The monosaccharide composition of the resulting fractions was studied by PC  $[(\text{CH}_3)_2\text{CO}:n\text{-BuOH}:\text{H}_2\text{O}, 7:2:1]$  using FN-12 and -13 paper with development by anilinium acid phthalate at 100-110°C for 10 min after acid hydrolysis ( $\text{H}_2\text{SO}_4$ , 2 N, 100°C, 4 h) [4, 5].

WSPS were friable white or gray powders that dissolved in water to form slightly cloudy solutions. An aqueous solution of the polysaccharides gave a positive test with iodine, which indicated the presence of glucan-type polysaccharides. The monosaccharide composition was mainly rhamnose, xylose, mannose, glucose, fructose, and galactose.

PS were brown powders that dissolved in water with heating. The hydrolysate of PS contained the monosaccharides in addition to galacturonic acid.

HC were friable dark-brown powders that dissolved in base. The dominant components were glucose and galactose.

TABLE 1. Carbohydrate Components of *Brassica oleracea* (Plenck) var. *italica*

Broccoli variety	Content, %				
	LS	SSA	WSPS	PS	HC
Romaneska	4.62	18.85	10.85	3.10	31.67
Linda	3.93	18.56	7.04	4.25	23.22
Tonus	3.45	7.32	3.57	9.99	7.86
Kalabraize	3.89	9.64	2.33	8.75	6.89
Vitaminic	5.39	12.63	13.50	6.11	34.18

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## REFERENCES

1. V. S. Kislichenko, I. N. Vladimirova, and O. A. Makhotina, *Xth International Conference "Phytopharmacy 2006: Current Problems in Creating New Drugs of Plant Origin,"* June 27-30, 2006, St. Petersburg (2006), 127.
2. R. Haas, B. P. Burns, and M. Asahi, *Curr. Opinion Gastroenterol.*, **17**, Suppl. 1, 1 (2001).
3. R. Liston, M. A. Pitt, and A. K. Banerjee, *Gerontology*, **42**, No. 2, 597 (1996).
4. T. V. Orlovskaya and V. A. Cherlombit'ko, *Khim. Prir. Soedin.*, 389 (2006).
5. I. M. Valdimirova and V. S. Kislichenko, *Med. Khim.*, **7**, No. 4, 30 (2005).